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# Ultrawideband Regulatory Activities

## Outputs

- Comments provided to NTIA on UWB regulatory proposals.
- Comments on proposed new ITU-R study questions regarding UWB devices.
- Measurement advice to entrepreneurs developing UWB devices.
- Emission measurements of Part 15 devices.

In May 2000, the Federal Communications Commission (FCC) released a notice of proposed rule-making (NPRM) on ultrawideband (UWB) systems, asking for a wide range of information on UWB systems, interference from UWB systems, and proposals for how they should be regulated. At that time, there was a wide range of technical opinion about how UWB systems interacted with traditional radio systems, and how they should be regulated. In FY 2000 and FY 2001, ITS staff made extensive measurements to characterize UWB device emissions. In addition, ITS made extensive measurements of UWB interference to various types of global positioning system (GPS) receivers. This work was summarized in NTIA Reports 01-383, 01-384, and 01-389. Subsequently, NTIA/OSM engineers used ITS measurements to predict how UWB devices would interfere with Federal systems and GPS. These predictions were summarized in NTIA Special Publications 01-43, 01-45, and 01-47.

Throughout and following the period of measurement and analysis, NTIA and the FCC were closely considering what regulations and numerical regulatory limits would be appropriate for the use of UWB devices. Intensive negotiations generated extensive draft documentation on many contentious and elusive issues, including allowable emission levels in specific frequency bands and special regulations for GPS bands, aimed at creating a new section of Part 15 of the FCC rules. ITS monitored and reviewed this documentation on a daily basis. ITS technical experts provided comments on many aspects of these negotiations, especially with respect to measurement

procedures and the changing units of regulatory limits. It was often useful for ITS to comment on a range of topics such as interpreting the results of our laboratory and field measurements. In addition to some 80+ sets of comments sent by ITS to NTIA in FY 2002, many thorough reviews of the document changes resulted in no required comments.

In February 2002, the FCC released a first report and order (FR&O) on UWB device rules. This FR&O included rule-making that followed many of the NTIA recommendations and allowable emission levels (see Figure 1 below). A recommended major change from earlier FCC Part 15 procedures included the adoption of root mean square (RMS) weighting and well-defined integration times and measurement conditions. Such details were particularly important because of the wide range in numerical answers that result from seemingly small details like detector weighting functions. The FR&O stated that the initial regulations would be reviewed in 6-12 months and possibly adjusted according to information that becomes available in the intervening time.

While many observers applauded the new UWB rules, others stated that they were either much too permissive or much too restrictive. One application in particular, ground penetrating radars (GPRs), is subjected to much more stringent regulation under the new rules. This seems strange to some, because

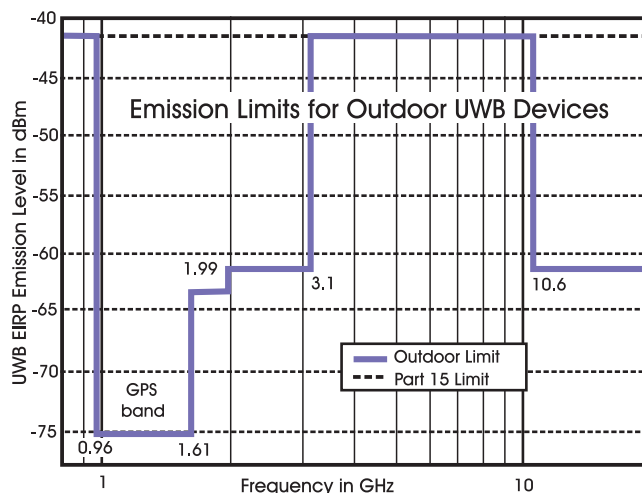
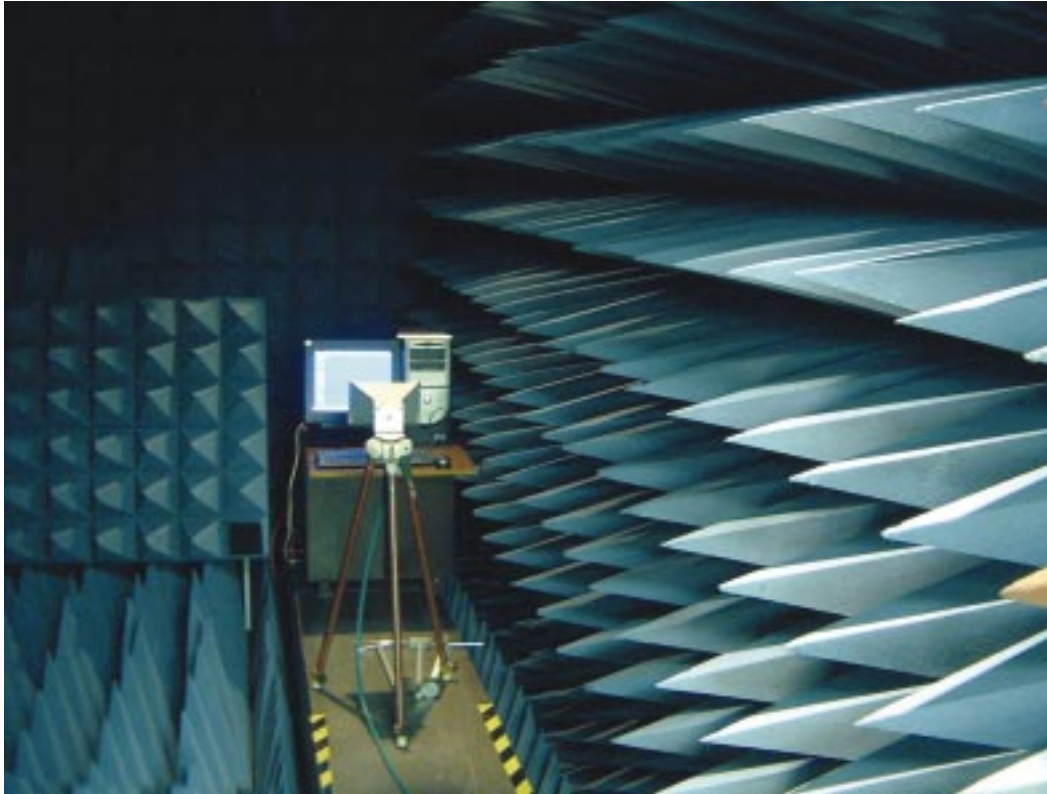


Figure 1. Emission limits for outdoor UWB devices, based on FCC first report and order on UWB device rules.



*Figure 2. Emissions produced by a personal computer are measured in a NIST anechoic chamber with an ITS measurement system (photograph by F.H. Sanders).*

GPRs arguably have the longest history of use of all UWB devices, with apparently few instances of interference. However, many share frequency bands with particularly critical safety and defense systems.

Paralleling U.S. activity in regulation of UWB systems, the International Telecommunication Union — Radiocommunication Sector (ITU-R) has also begun a study program on UWB devices. ITS commented on proposed new ITU-R study questions, which will become a part of ITU-R Study Group 1/8 activities.

Following the release of the FCC UWB regulations, ITS has continued to serve a tutorial and advisory role. Entrepreneurs are developing new UWB devices and are attempting to measure them according to the techniques described in the FR&O. Requests have come from as far away as Germany, where a 24-GHz short-range automotive radar was being characterized according to the new UWB criteria. In this case, peculiar measurement results were traced to inadequate (sub-Nyquist) digital sampling rates in the measurement instrumentation. ITS has investigated the feasibility of making some of the low level measurements required for some frequen-

cies for UWB devices. ITS and other agencies have continued research in areas related to the deployment of UWB devices. ITS has made measurements of the emissions from other Part 15 devices, such as computers, to see how the emissions from such devices compare with UWB emissions (see Figure 2 above). In addition, ITS continues to make a limited number of measurements of environment noise background, part of a “reality check” on interference models that assume  $kT$  as the applicable noise background for many radio systems. ITS has also conferred with other Federal Agencies concerning background noise measurements.

It is expected that ITS will continue an involvement in UWB measurement and regulatory activities in the coming year, particularly as new UWB devices appear on the market, and as needed to react to changes proposed in the scheduled 6-12 month FCC review of the UWB rules.

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